



Rapid Bridge Repair Workshop “Project Selection”

May 21, 2009

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Project Selection

Traffic Control

and

Bridge Repair



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Project Selection

Traffic Control

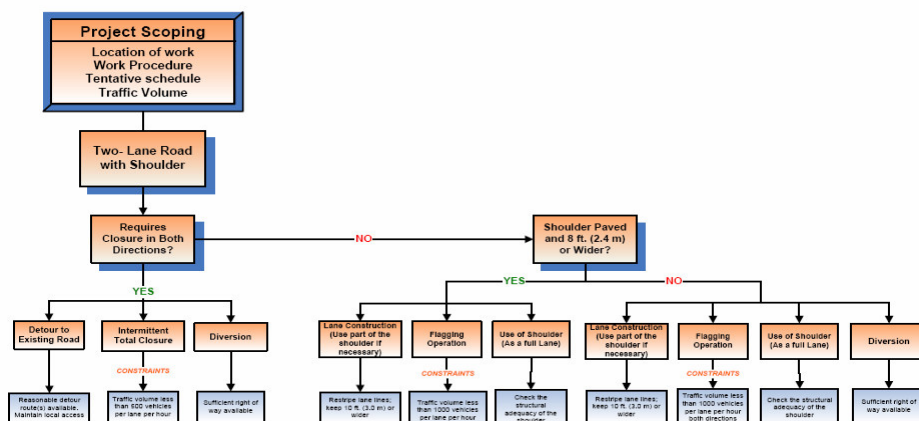
and

Bridge Repair



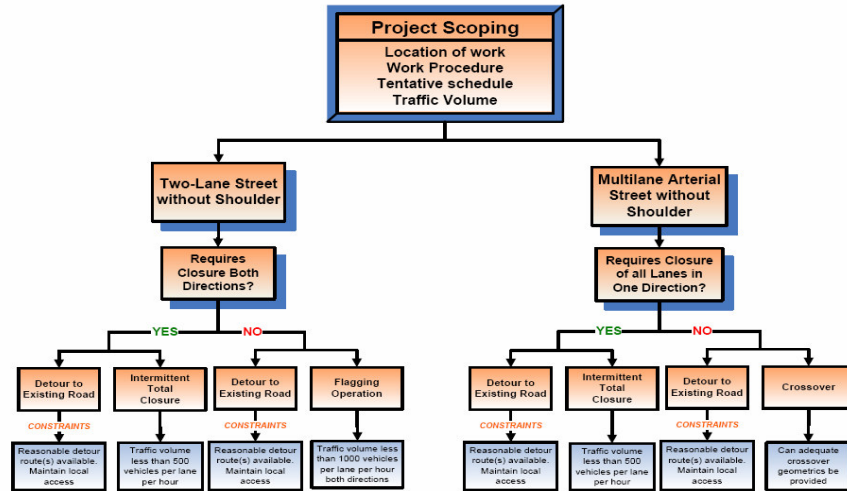
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Project Selection Traffic Control



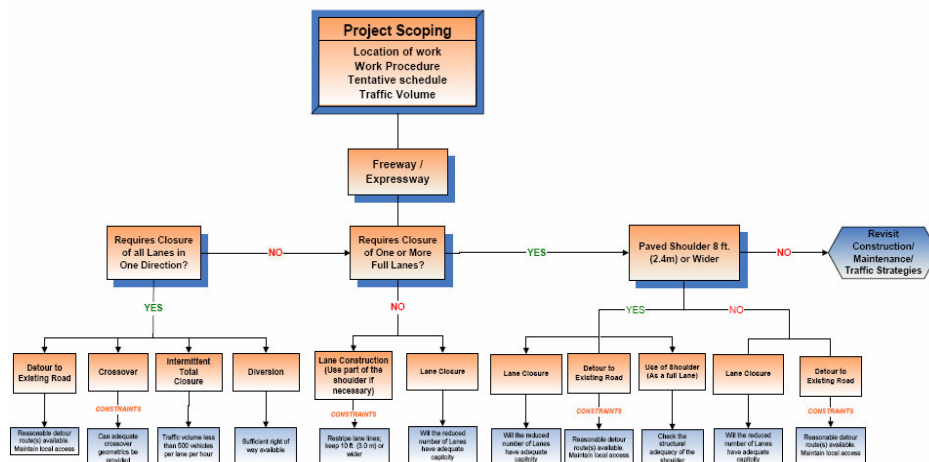
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Project Selection Traffic Control



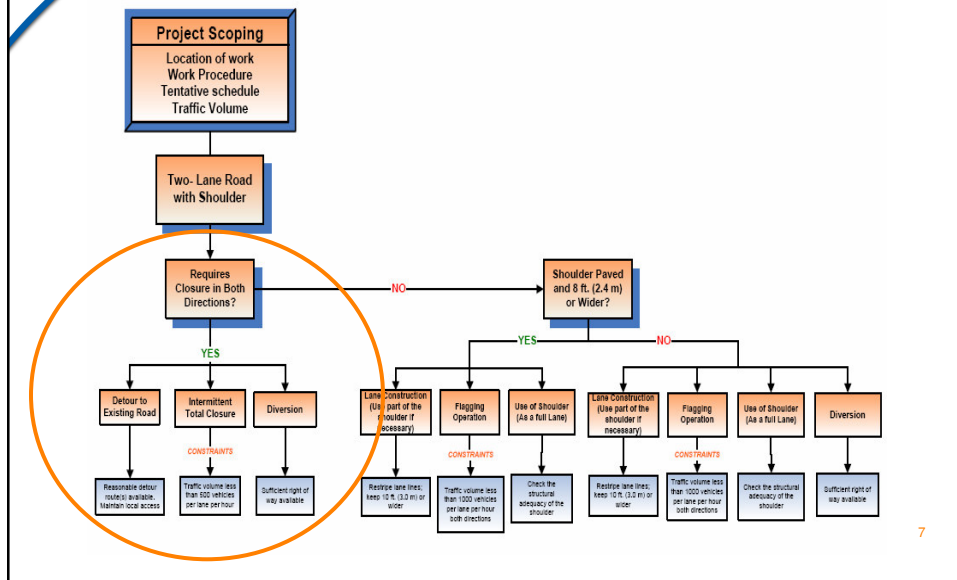
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Project Selection Traffic Control



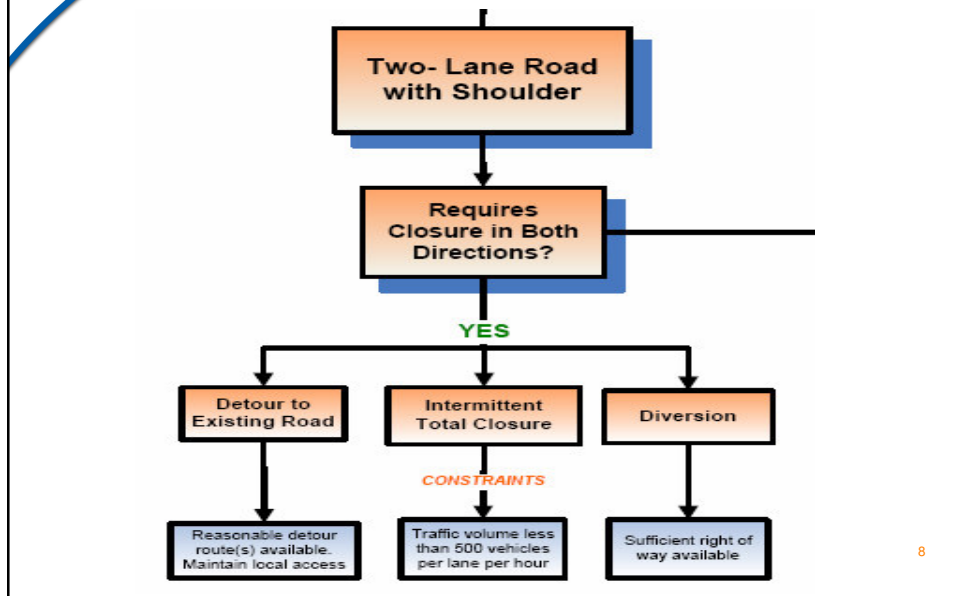
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Project Selection Traffic Control



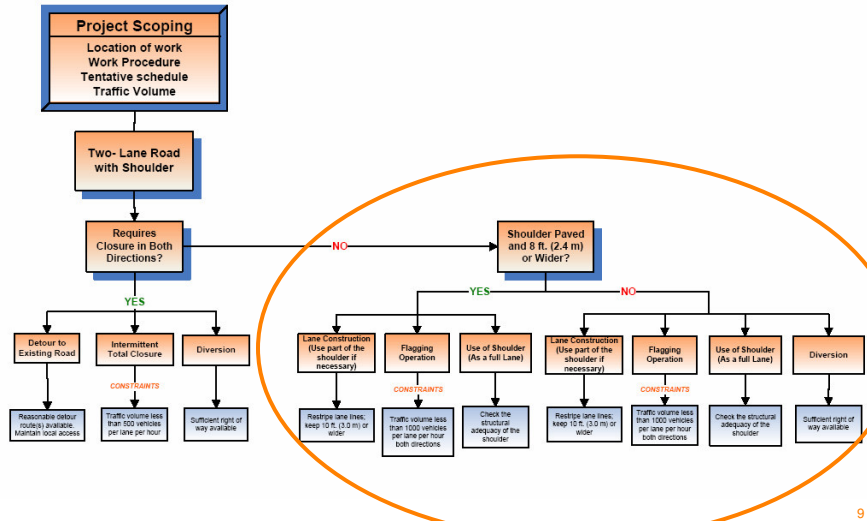
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Project Selection Traffic Control



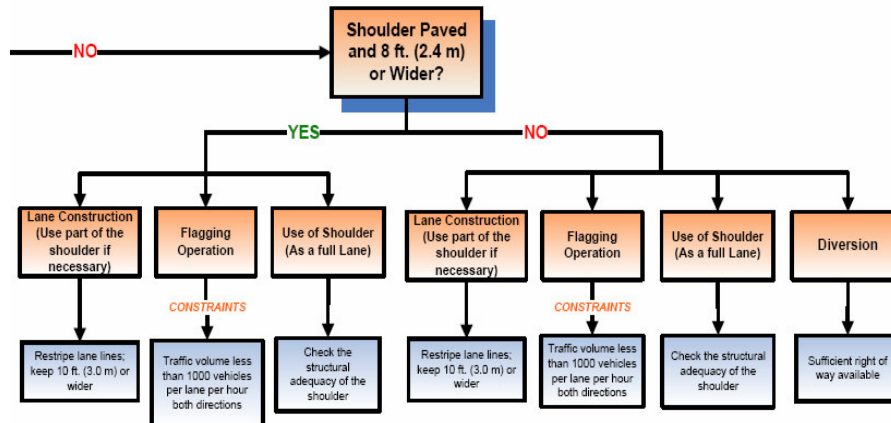
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Project Selection Traffic Control



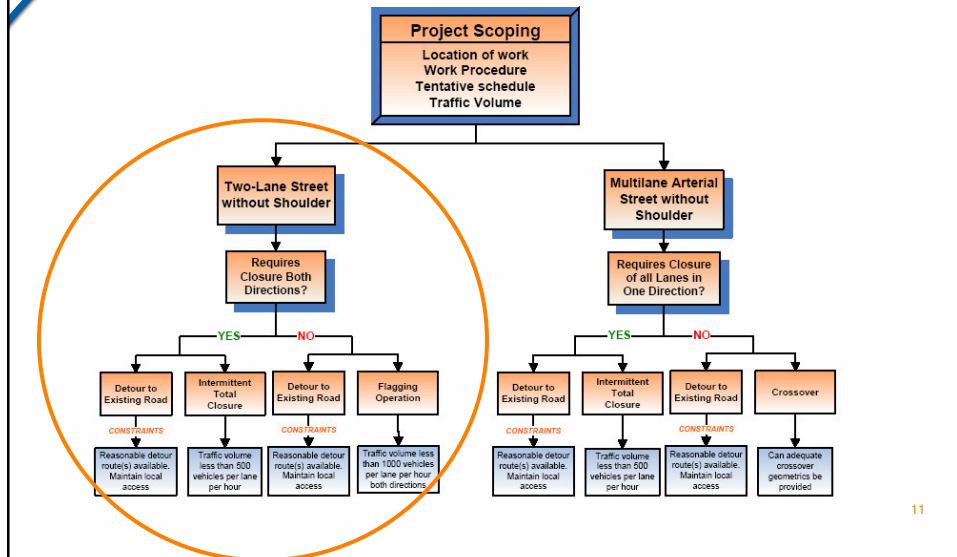
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Project Selection Traffic Control



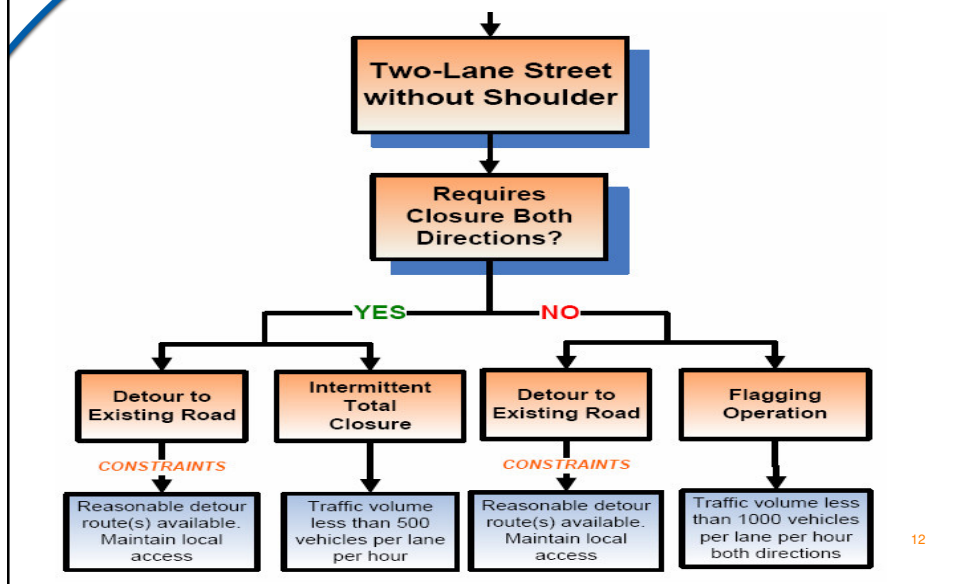
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Project Selection Traffic Control

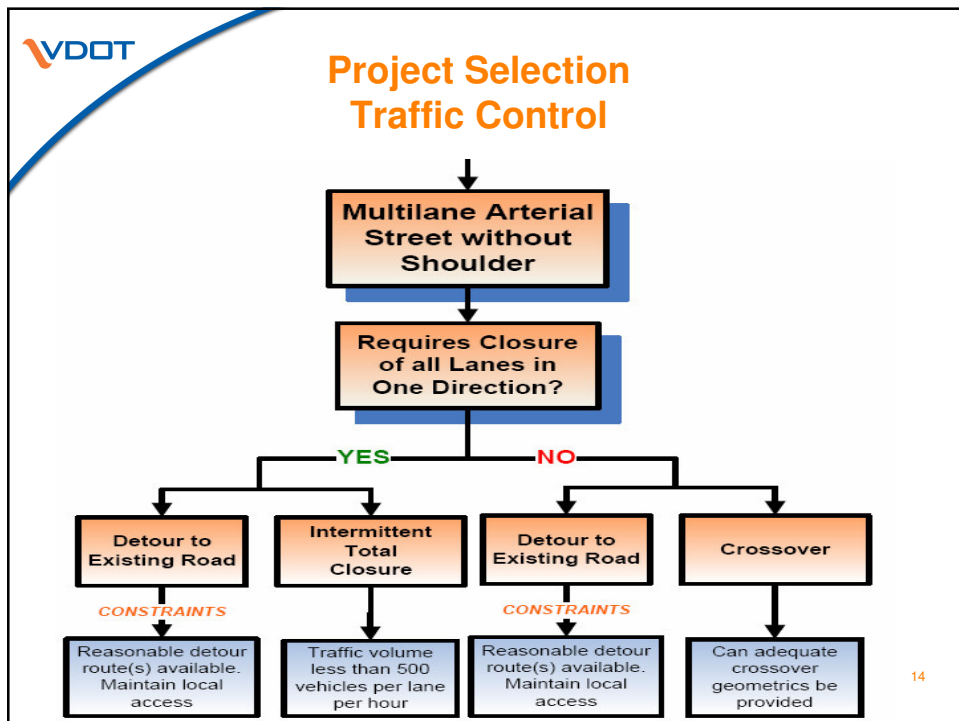
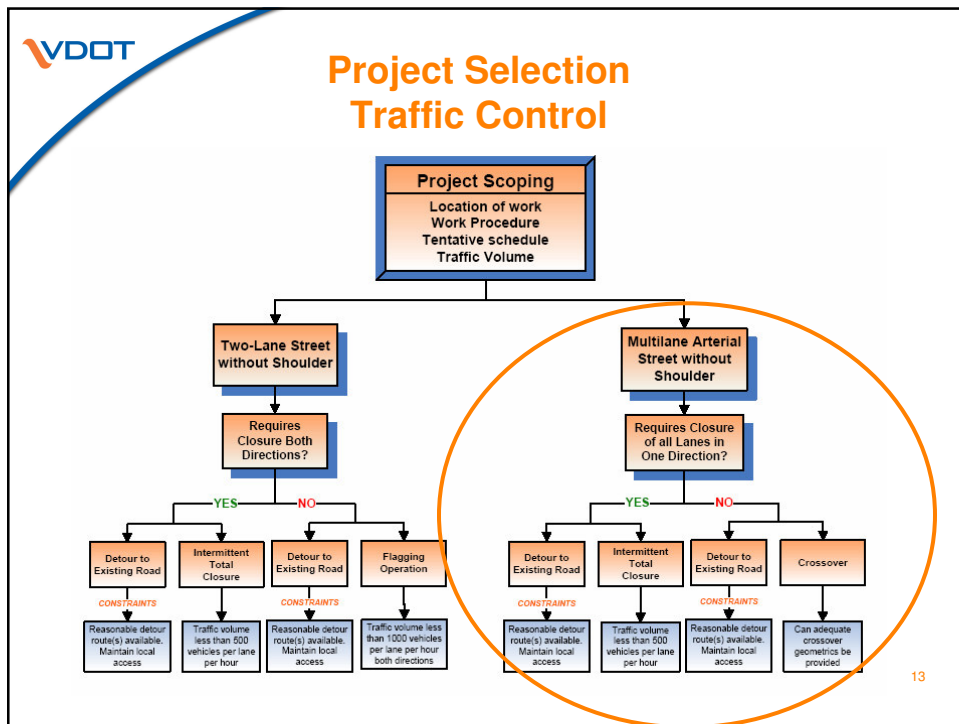


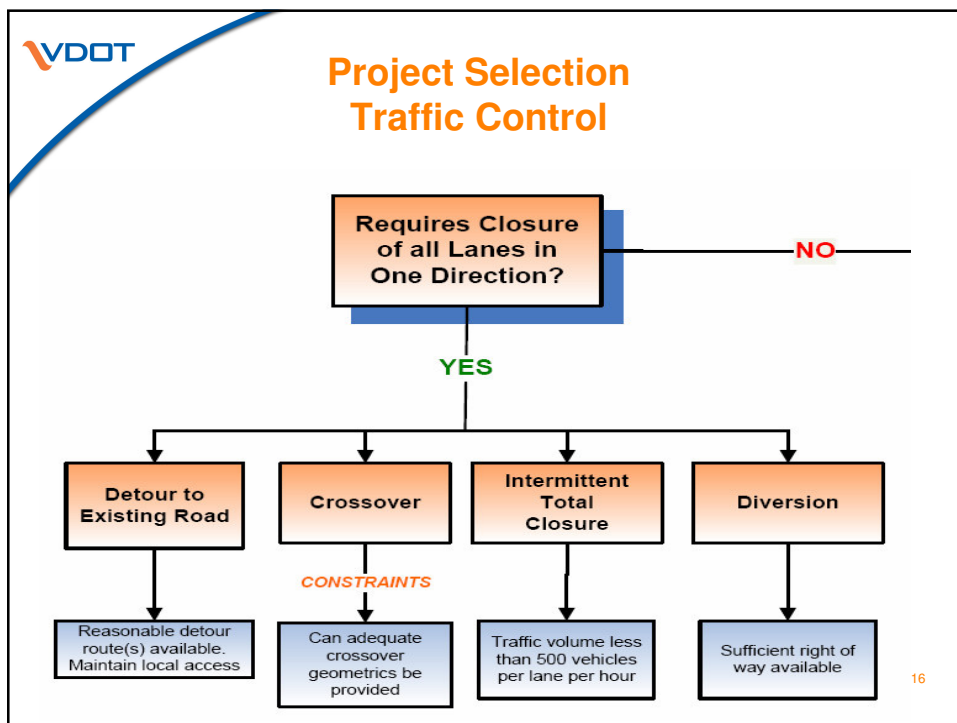
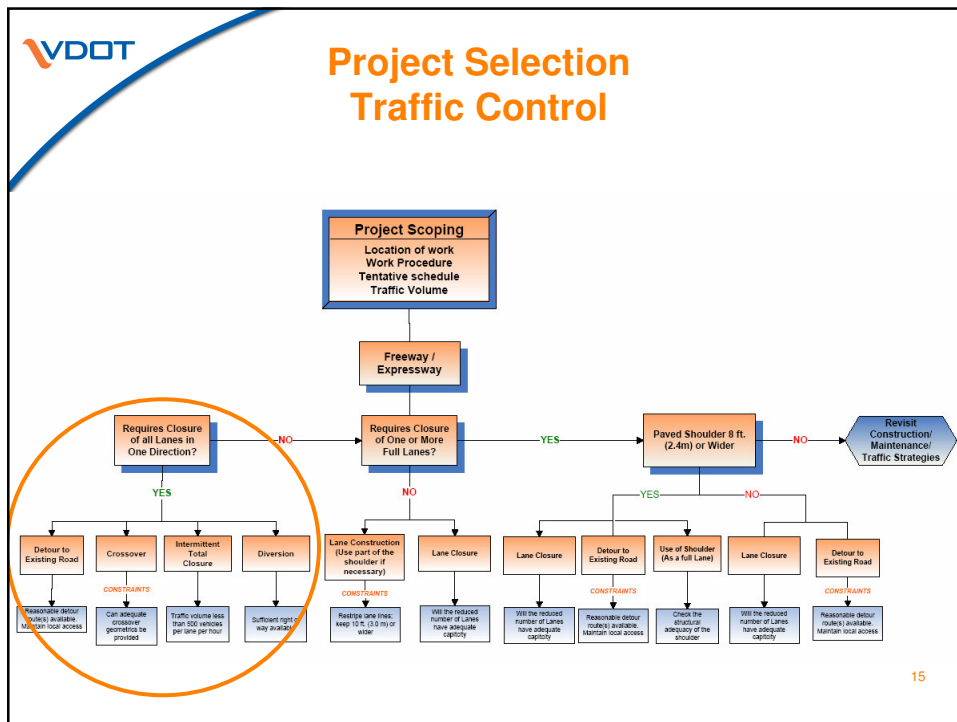
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Project Selection Traffic Control

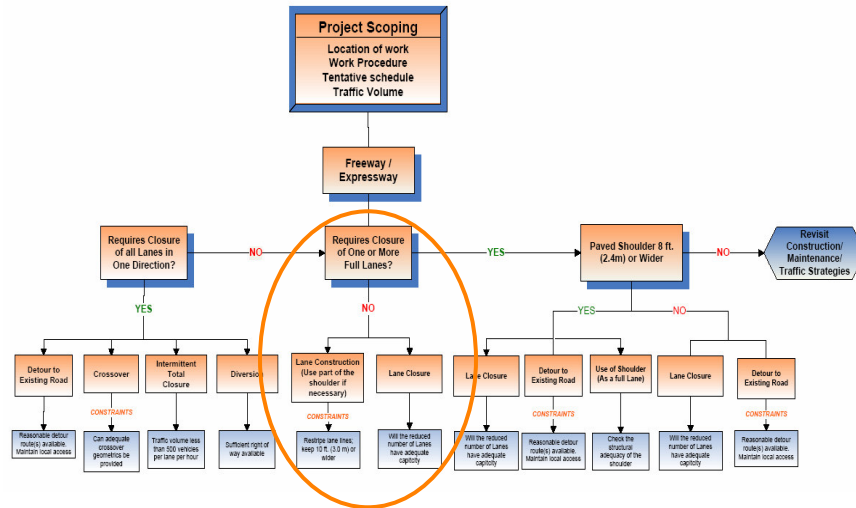


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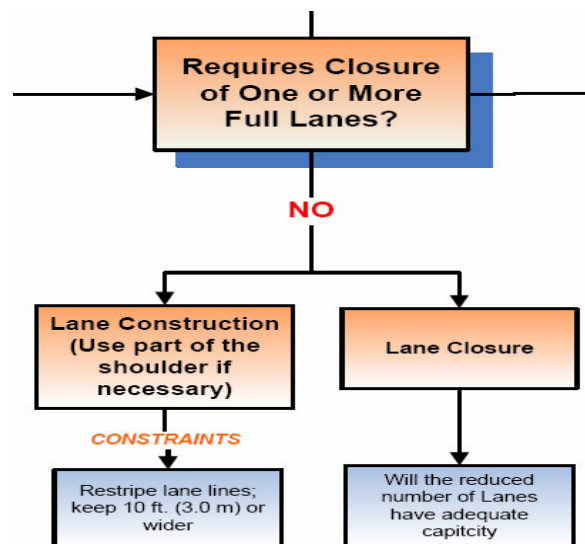


Project Selection Traffic Control



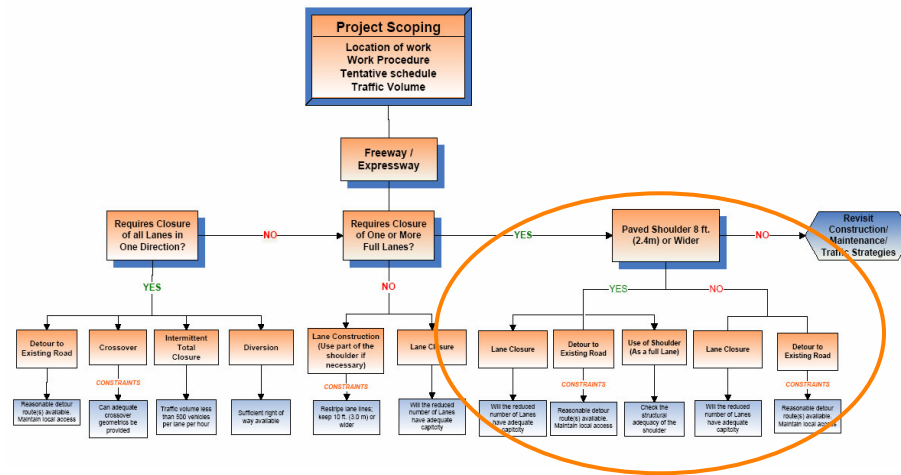
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Project Selection Traffic Control



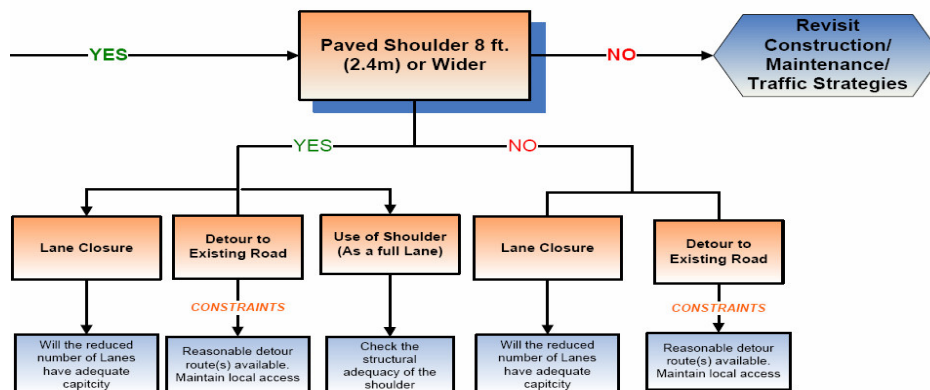
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Project Selection Traffic Control



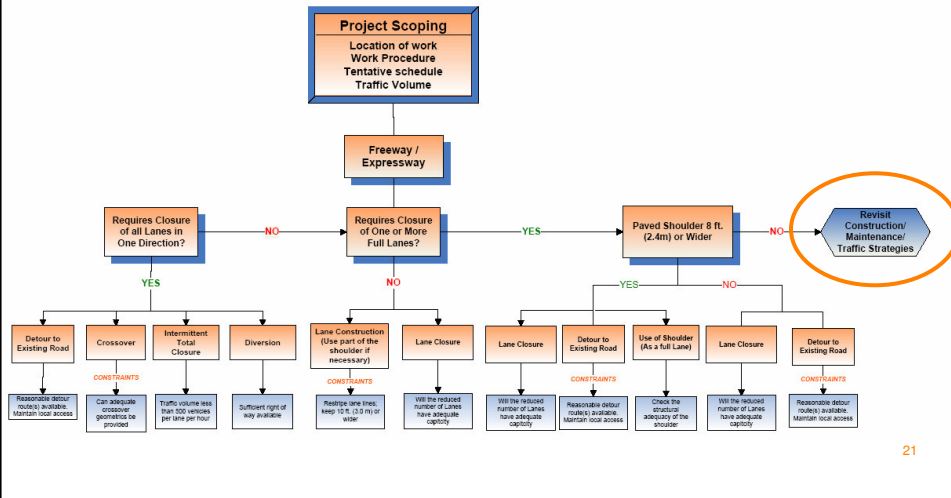
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Project Selection Traffic Control



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Project Selection Traffic Control



Project Selection

Traffic Control

and

Bridge Repair

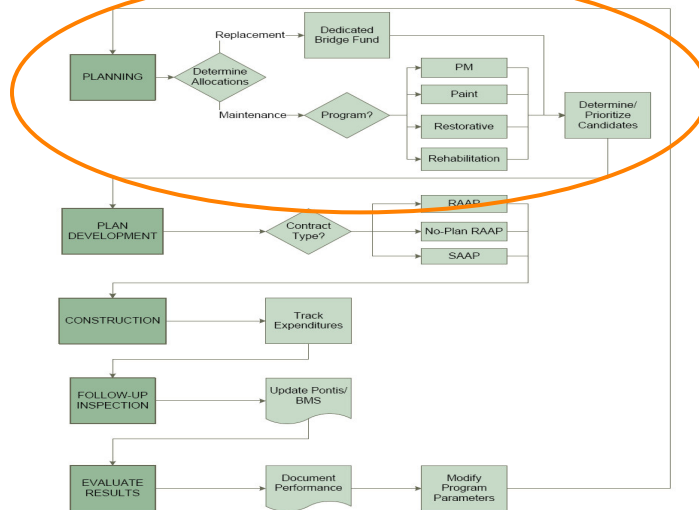


Project Selection

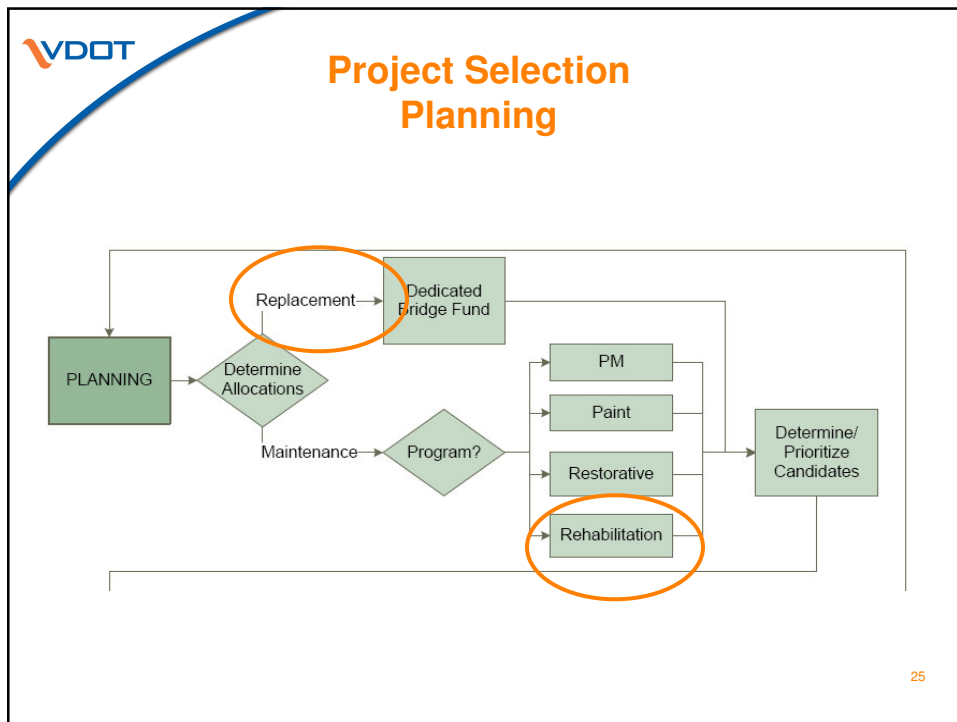
Preliminary planning is needed to identify optimum lane closure and repair option.

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Salem District Bridge Program Process



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VDOT

Project Selection Bridge Replacement \ Rehabilitation

- **Replacement – Dedicated Bridge Fund**
 - **Complete Structure Replacement or Major Rehabilitation**
 - Structurally Deficient (SD)
 - Functionally Obsolete (FO)
- **Rehabilitation – Maintenance**
 - **Superstructure Replacements**
 - SD/FO and Superstructure GCR < 5
 - **Deck Replacement**
 - SD/FO Deck and GCR < 5
 - **Culvert Rehabilitation**
 - SD/FO and Culvert GCR < 5

A photograph of a concrete bridge with two piers, spanning a river. The bridge has a simple design with a flat deck and a metal railing. The surrounding area is wooded with trees showing autumn foliage. The river is visible in the foreground.

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Project Selection Bridge Replacement \ Rehabilitation

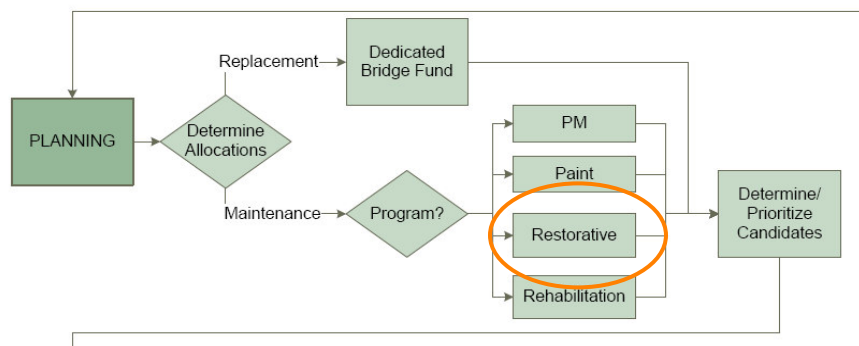
Rapid Repair Consideration:

- Prefabricated Units
 - Substructure
 - Superstructure
- Rail Options
- Phase Construction
- Adding Lanes
- Detours



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Project Selection Planning



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Project Selection Bridge Restoration

- **Restorative**
 - **Rigid Deck Overlays**
 - Pontis Deck Elements
 - Pontis Deck Condition State : 100% > State 3
 - **Superstructure Repairs**
 - Pontis Superstructure Concrete Elements
 - Pontis Condition State : 15% => State 3
 - **Substructure Repairs**
 - Pontis Substructure Concrete Elements
 - Pontis Condition State : 75% => State 2

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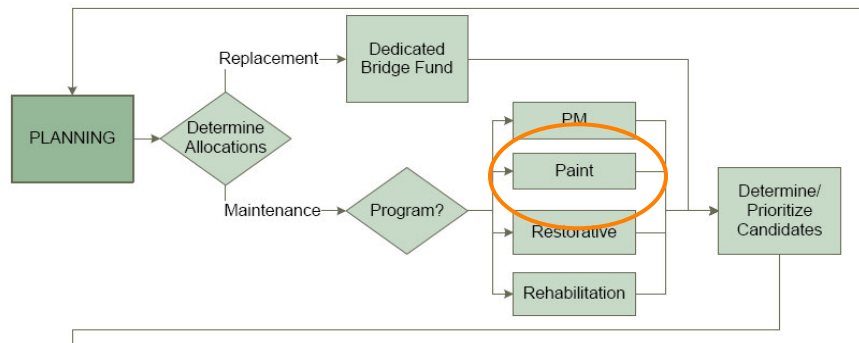
Project Selection Bridge Restoration

Rapid Repair Consideration:

- **Rapid Repair Materials and Techniques**
 - **Concrete Overlay Options**
 - Conventional LMC (3 – 7 day cure time)
 - LMC-HE (24 hour cure)
 - LMC-VE (3 hour cure time)
 - **Hydro Demolition**
 - **Others**
- **Lane Closure Options**
 - **Short Duration Lane Closures**
 - **Weekend Lane Closures**
 - **Off Peak Hours**

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Project Selection Planning



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Project Selection Painting

- Paint
 - Pontis Elements (Primarily Element 107)
 - Pontis Condition State : 80% >= State 3

ion Models and Optimization									
Element: Paint Stl Opn Grder (107)		Env:	Low	Metric		English			
Element: Paint Stl Opn Grder (107)		Env:	2	Transition Probabilities to State					Unit Cost (\$)
Action (>= recommended)				1	2	3	4	5	Direct Long-Term
State: 1 - No corrosion									
>> 0	Do Nothing			96.59	3.41	0.00	0.00	0.00	Optimal Percent in State: 96.13
									15.66
State: 2 - Paint distress									
>> 0	Do Nothing			0.00	90.57	9.43	0.00	0.00	Optimal Percent in State: 3.38
1	Spot blast, clean, and paint			95.00	3.00	2.00	0.00	0.00	38.56
2	Repaint entire element			99.00	1.00	0.00	0.00	0.00	46.83
									62.30
State: 3 - Rust formation									
>> 0	Do Nothing			0.00	0.00	84.09	15.91	0.00	Optimal Percent in State: 0.42
1	Spot blast, clean, and paint			80.00	15.00	5.00	0.00	0.00	58.96
2	Repaint entire element			99.00	1.00	0.00	0.00	0.00	70.97
									62.30
State: 4 - Active corrosion									
>> 0	Do Nothing			0.00	0.00	0.00	79.37	20.63	Optimal Percent in State: 0.07
1	Spot blast, clean, and paint			0.00	0.00	10.00	87.00	3.00	82.95
>> 2	Repaint entire element			99.00	1.00	0.00	0.00	0.00	164.63
									62.30
State: 5 - Section loss									
>> 0	Do Nothing			0.00	0.00	0.00	0.00	93.30	Optimal Percent in State: 0.00
>> 1	Repaint entire element			0.00	0.00	80.00	15.00	5.00	241.37
2	Rehab element			90.00	10.00	0.00	0.00	0.00	62.30
3	Replace element			100.00	0.00	0.00	0.00	0.00	161.85
									425.44
Units: (LF)									Agency Failure Cost: 2,052.58
Long-Term Optimal Unit Cost (\$) : 1.07									User Failure Cost: 0.00
									Probability of Failure from Last State: 6.70

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Project Selection Painting

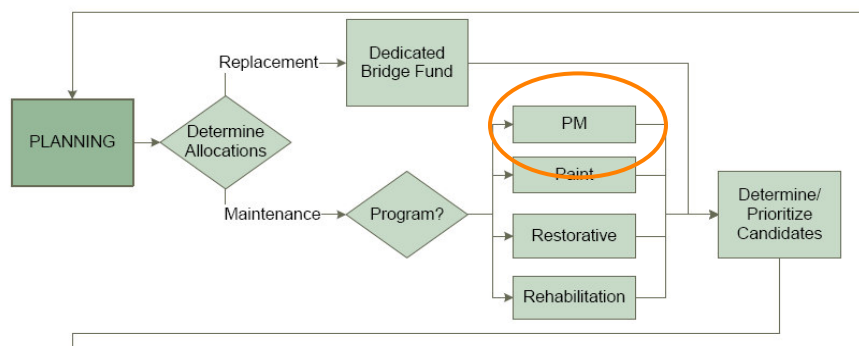
Rapid Repair Consideration:

- **Paint System**
 - Moist Cured Polyurethane
 - Others
- **Surface Preparation**
- **Rapid Deployment Containment System**
- **Traffic Control**

Painting bridges in a timely manner reduces the need for major rehabilitation and replacement projects.

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Project Selection Planning



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Project Selection Bridge PM

- **Preventative Maintenance**
 - **Bridge Cleaning**
 - Cyclical Basis (Decks, Beam Ends, Seats)
 - **Joints**
 - Cyclical Basis ???
 - Pontis Joint Elements
 - Pontis Condition State : 50% => State 2
 - **Deck Sealing**
 - Pontis Deck Cracking Smart Flag
 - Pontis Condition State : 100% =< State 2
 - **Thin Deck Overlays**
 - Pontis Deck Elements
 - Pontis Condition State : 100% = State 3

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Project Selection Pontis Elements

Bridge: 0761044-000000000014178 Find... Inspections (6) 02/23/2007 Metric English Reports... Save

CONDITION 3 WORK 4 APPRAISAL 5 INVENTORY 6 AGENCY 7 SCHEDULE

NBI Rating: Deck (58): 6 Satisfactory Substructure (60): 7 Good Culvert (62): Not Applicable
 Superstructure (59): 7 Good Channel (61): Not Applicable Waterway (71): Not Applicable
 Unrepaired spalls: -1.000 (SF) Review Needed: ☒ Status: New

Create Element Edit Element Remove Element NBI Translator Suff Rate Validate Quantity Percent

Key: 0 Structure Unit ID: 0 Type: M Main

Elem / Env	Element Description	Quantity	UOM	Pct1	Pct2	Pct3	Pct4	Pct5
12 / 2	Bare Concrete Deck (ea)	10,681.00	(SF)	0.0	100.0	0.0	0.0	0.0
331 / 2	Conc Bridge Railing	547.90	(LF)	100.0	0.0	0.0	0.0	0.0
302 / 2	Compressn Joint Seal	81.00	(LF)	70.4	29.6	0.0	0.0	0.0
321 / 2	R/Conc Approach Slab	2.00	(EA)	50.0	50.0	0.0	0.0	0.0
107 / 2	Paint Stl Opn Girder	1,640.42	(LF)	0.0	0.0	100.0	0.0	0.0
311 / 2	Moveable Bearing	12.00	(EA)	58.3	41.7	0.0	0.0	0.0

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Project Selection Pontis Elements

Bridge: 0761044-000000000014178 Find... Inspections (6) 02/23/2007 Metric English Reports... Save

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Create Element Edit Element Remove Element NBI Translator Suff Rate Validate Quantity Percent

Key: 0 Structure Unit ID: 0 Type: M Main

Elem / Env	Element Description	Quantity	UOM	Pct1	Pct2	Pct3	Pct4	Pct5
313 / 2	Fixed Bearing	6.00	(EA)	83.3	16.7	0.0	0.0	0.0
205 / 2	R/Conc Column	4.00	(EA)	100.0	0.0	0.0	0.0	0.0
215 / 2	R/Conc Abutment	85.30	(LF)	90.6	4.7	4.7	0.0	0.0
234 / 2	R/Conc Cap	42.65	(LF)	88.3	4.7	7.0	0.0	0.0
295 / 2	Reinforced Concrete	49.21	(LF)	98.0	2.0	0.0	0.0	0.0
358 / 2	Deck Cracking SmFlag (ea)	1.00	(EA)	0.0	0.0	100.0	0.0	0.0

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Project Selection Bridge PM

Rapid Repair Consideration:

- Most Preventative Maintenance Bridge Repairs are Short in Duration
- Flexibility with Traffic Control

A comprehensive bridge preventative maintenance program is the best *Rapid Repair Option*.

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Project Selection Bridge Contract Cost

- * **Cost** (Includes Indirect Cost; mobilization, traffic control, roadway items)
 - Joints - \$3/SF
 - Seal Decks - \$5/SF
 - Thin Overlays - \$12/SF
 - Rigid Overlays - \$85/SF
 - Deck Replacements - \$165/SF
 - Superstructure Replacements \$400/SF

*Salem District Cost Data

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Project Selection Summary

Preliminary planning is needed to identify optimum lane closure and repair option.

- Begin with work zone traffic analysis
- Identify and prioritize lane closure options (none, night, weekend, continuous)
- Identify bridge repairs that can be done with each lane closure option
- Select lane closure and repair option

Using rapid repair materials and techniques does not necessarily result in a rapid repair. The entire project must minimize traffic disruption.

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